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UNIDO'S WORK IN HAZARDOUS CHEMICALS, POLLUTION CONTROL, RESOURCES MANAGEMENT, RISK ASSESSMENT/RISK MANAGEMENT

General Considerations
and
Alternative Available Technologies *

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UNIDO's WORK IN HAZARDOUS CHEMICALS, POLLUTION CONTROL, RESOURCES MANAGEMENT, RISK ASSESSMENT/RISK MANAGEMENT

An important aspect of UNIDO's work is to learn from the experience of industrialized countries and to avoid severe health and environmental pollution problems through the transfer of appropriate technologies and pollution control mechanisms as an essential part of industrial development -- which is UNIDO's main mandate.

Moreover, UNIDO's role is to provide to the policy makers of developing countries a better understanding of environmental problems and appreciation of early remedial action. One way to achieve this is through the application of environmental impact assessment and risk assessment methodologies.

UNIDO is aware that pollution in its broadest sense is an impairment to the quality of life and even to sustainable industrial growth. Subsequently, for several years now, UNIDO has embarked in technical assistance projects that aim to improve and protect environmental resources in developing countries.

The mandate for UNIDO's duty to assist developing countries in environmental matters derives from the Lima Declaration and Plan of Action (1985), in particular paragraph 39, which was endorsed by the General Assembly in Resolution 3362 (S-VII). The organization was asked to mobilize human and material resources to cope with problems which threaten the environment and was given an additional mandate to investigate and promote the choice and application of appropriate technology for the benefit of the industrialization of the developing countries.

In this connection UNIDO's duty in the process of assisting countries with their industrialization, is to help developing countries to identify least polluting and cost-effective technologies and further, to assist in

the control of already existing problems either through appropriate treatment and disposal or through treatment and reutilization/recycling which also promotes resource conservation.

In the performance of this duty we are applying our expertise in conducting environmental impact assessments, engineering studies of facts, economic assessments of costs and benefits, elaborations and evaluations of proven low- and non-waste technologies either in production processes and/or in recycling of waste materials and in transferring know-how in pollution monitoring and control, waste treatment and disposal, etc. Furthermore, we are assisting in rigorous training and human resources development in all aspects of pollution assessment and control as well as in all aspects of environmental and energy resources management and industrial safety.

Since 1972 UNIDO has developed and implemented about 172 projects related to industrial pollution control and management of environmental resources.

A corresponding number of technical reports have been submitted to the respective governments. Currently UNIDO implements about 60 projects in this area. This represents about 10 per cent of the total UNIDO technical assistance budget.

In the process of this technical assistance UNIDO co-operates closely with other national, regional and international agencies such as the United Nations Environment Programme, the International Atomic Energy Agency, the World Health Organization, the United Nations Development Programme, the International Labour Organization, the Food and Agricultural Organization, the Economic Commission for Europe, etc.

Specifically, UNIDO's programme focuses attention on the following major areas:

Developing Low- and Non-Waste Technologies, Reutilization and Recycling of Wastes, Energy Conservation and Promotion of Non-Conventional Sources of Energy

In the low- and non-waste technology area UNIDO implements a considerable number of interesting projects.

One of the projects which we are considering of great importance not only for the country that implements it but as well for other industrializing countries is the "Development of Low- and Non-Waste Technologies for Selected Chemical Processes" in Czechoslovakia. A first rate scientific local team in the Prague Institute of Chemical Technology has undertaken in co-operation with industrial Czechoslovakian specialists and with the assistance of eminent international experts the elaboration of low waste production methodologies in the following areas:

- Oil refining with special attention to removal of sulfur compounds from petrochemical raw materials and products;
- Production of sulfuric acid with special attention to minimize SO_2 emissions and to use waste heat;
- Production of nitric acid with special attention to minimize NO_x emissions;
- Organic synthesis with special attention to replacement of traditional chemical reduction by non-waste catalytical hydrogenation.

UNIDO has provided assistance through the provision of international experts, equipment, technical literature and rigorous training in well-known institutions of Austria, the Federal Republic of Germany and the United Kingdom.

The project opts to maximize the rational use and processing of natural resources thus leading to the conservation of raw materials and energy and improvement of environmental conditions by reducing and/or eliminating wastes generated by the chemical industry.

The output of the project which is intended to be utilized by relevant Czechoslovakian industries will be discussed internationally at the Workshop on Low- and Non-Waste Technology which is scheduled to take place in Prague between 23 and 26 of October, this year. About 25 specialists from developing and developed countries have been invited to attend.

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Another important project is related to energy conservation in industry and UNIDO is executing this project in Europe on a regional basis with direct participation of nine European countries which are eligible for UN assistance, e.g. Bulgaria, Cyprus, CSSR, Hungary, Malta, Poland, Portugal and Yugoslavia.

Besides these countries, there are also a number of more advanced European countries such as the Federal Republic of Germany, Sweden, the United Kingdom and France, which take part in the project.

The project is aimed at promoting efficient use of energy in industry and, among many subjects related to this field, it specifically deals with such issues as waste energy recovery, utilization of wastes for energy and efficient energy supply through co-generation.

All these issues have an important impact on environmental protection. For instance, waste energy appears mainly in flue gases from furnaces, boilers, kilns, etc. The recovery of these gases reduces the thermal load of the environment, reduces the smoke content in the air, etc. Utilization of wastes for energy means, first of all, cremation of the wastes, which also helps in solving such an important problem as waste disposal.

And the third direction means application of combined heat and power system, which is particularly efficient in big industrial agglomerates with dangerous air pollution and thermal load.

As you may see, the above three issues are relevant to the conditions of many countries of the European region with its developed and diversified industry. In our regional project, therefore, we are assisting the countries

to establish co-operation in exchange of experience, joint research and other efforts to upgrade their level in handling the above problem.

We organized several workshops in the project countries where these subjects were studied.

We are providing the project countries with the opportunity to get acquainted with the most advanced experience available in this field through expert and consultancy services, sub-contracting, study tours, etc.

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Another means to minimize environmental risk from waste generation/ disposal and the risk of resource depletion is recycling. In the area of recycling UNIDO has developed several projects. An interesting case in point is the recycling of used oils generated by industry and means of transportation.

Unlike many other materials used in present-day societies, lubricating oils made from petroleum can be re-used as lubricants or for other purposes. It is therefore worthwhile to collect them (at least significant quantities of them), keep them free of contamination by other substances, and plan for their re-use. When they are not suitable for re-use they should be disposed of carefully, since indiscriminate disposal causes considerable damage to water, air and land resources.

UNIDO's activities in this area include a combined project with UNEP's Mediterranean Action Programme to assess the waste oil situation in the 17 countries that border the Mediterranean Sea and to recommend ways that could divert waste oils entering the Mediterranean either to recycling or to controlled and environmentally acceptable disposal ways.

Similar projects aiming at transferring appropriate technology for dealing with waste oil problems are being implemented by UNIDO in Seychelles, Togo and Burkina Faso.

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Finally, in the area of hazardous waste management UNIDO is ready to embark in the implementation of a large East-West project which will establish a Regional Centre for Hazardous Waste Management. The proposed participating countries are Albania, Bulgaria, Czechoslovakia, Hungary, Malta, Morocco, Portugal, Poland, Romania, Turkey and Yugoslavia. Proposed co-operating countries in this project are Austria, France, the Federal Republic of Germany, Greece, Italy, Netherlands, Portugal, Spain and Switzerland.

The physical location of the centre will be most likely in Poland.

The specific project objectives are:

To minimize and control the potential toxic effects of hazardous chemicals/waste both to human beings and environmental resources (air, water, soil) by developing the capability to adapt and introduce low- and non-waste technologies into production processes of chemicals and by elaborating management methods of hazardous materials/waste handling, treating, disposal and/or recycling.

Another major area of UNIDO's work is in the

Control of Air, Water and Solid Waste Pollution

UNIDO's projects in these areas are being implemented in several developing countries with a major one in India encompassing all aspects of pollution control.

A Pollution Control Research Institute in Hardwar, India, was established. The project was initiated in 1984 at the request of the Indian Government and is receiving the advisory co-operation of the Indian Department of Environment, Ministry of Industry, Indian National Engineering Organization, Universities, and the Indian private industrial organizations. The United Nations Development Programme contributed US$ 2.9 million which is to be allocated among equipment, international experts and training. The Indian Government committed 21 million rupees which are to be used for the construction of the Institute, the hiring of local technical and scientific personnel and locally purchased equipment.

The objectives of this project are the following:

a) Development of industrial pollution control technologies and equipment for air, water, noise and solid wastes;

b) Development of practical methods for the recovery and re-use of industrial waste;

c) Evolvement of processes and control procedures minimizing pollution generation;

d) Advising industry on how to introduce and maintain pollution control technologies and standards;

e) Serving as a reservoir of technical and scientific knowledge on pollution control technologies;

f) Providing training facilities.

Since 1984, UNIDO has purchased for the Institute a range of sophisticated equipment such as atomic absorbtion spectro-photometers, organic carbon analyzers, air samplers, gas chromatographs, trailer mounted venturi flue gas scrubbing system, mobile ambient air monitoring unit, mobile stack emission unit and much more. Along with this impressive equipment came the necessary training for the local personnel handling this equipment.

For the same project UNIDO is providing also training for a substantial number of technicians and scientists. This training takes place in various countries and in institutes and laboratories specializing in analytical and practical pollution control methods. Furthermore, UNIDO has sent an impressive team of international consultants in air, water, noise and solid waste pollution control and more experts are to visit the Institute during the next two years in order to advise on several crucial areas.

In 1986 the Institute has asserted its role especially in the priority areas according to set objectives.

Starting in April 1986 India's most holy river, the Ganges, greeted some 7 million pilgrims with a new cleaner look which was the result of a nation-wide campaign to control the growing threat posed by industrial pollution. In this priority the Pollution Control Research Institute in Hardwar has contributed in the clean-up drive.

Another of the Institute's priorities is the air pollution from power generation.

Indian coal has a high ash content and power stations are throwing thousands of tons of ash into the atmosphere together with a lot of nitrogen and sulfur dioxide. The Institute is assisting the Indian power generating industry to up-grade its electrostatic precipitator technology.

The Institute has already begun to have an impact on local industry. A number of projects, including noise studies, dust pollution control, and biological control of environmental pollution, are planned for the near future. While the Institute's buildings are designed to blend inconspicuously with the surrounding woodlands, the Institute's key role promises to make it more than conspicuous in the environment of India's industrial future.

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Another most interesting project is being now implemented in Romania, where UNIDO assists a scientific team of the Ministry of Machine Tools, Electrotechnics and Electronics to develop appropriate instrumentation for an air pollution monitoring and warning network system. To this effect a pilot system has been established.

The rapid industrial development of Romania takes place within large industrial compounds situated in close vicinity of highly populated urban areas, where different enterprises operate simultaneously. The technologies used by these enterprises often generate large amounts of pollutants which threaten the environment. The common pollutants could be identified as: oxides of nitrogen, sulfur dioxide, carbon monoxide, hydrocarbons, as well as

fine suspended particles of lead and silicon dioxides. The heavy urban traffic also contributes to the increase of air pollution.

The Romanian Government is deeply concerned about the quality of air. Legal and technical measures are taken to remedy and prevent pollution from air emissions disposed by industrial plants.

UNIDO's assistance to the Romanian Government in the development and manufacturing of specialized apparata and related detectors for the measuring of various pollutants has as an ultimate purpose not only to help the Country to develop its own inexpensive instrumentation but to transfer as well this technology to other developing countries.

A third and important area of UNIDO's work directly related to risk assessment preventions is the:

Assistance in Environmental Planning, Environmental Impact Assessment, Elaboration of Integrated Planning Concepts for Industrial Areas

In this area, UNIDO is assisting several countries in conducting environmental impact assessments of planned industrial activities and in establishing integrated planning concepts. A case in point is an on-going project in India.

People living in the Doon Valley believe that their environmental quality has deteriorated during living memory. Therefore, the Government of India (Department of Environment) has recently become concerned about the environmental problems which could be created by planned industrialization in the Doon Valley, located about 200 km north of New Delhi. Of special concern is environmental degradation due to limestone quarrying and limestone processing.

Under the aegis of UNDP and UNIDO, IIASA was awarded a 7-month contract in September, 1985 to undertake Phase I of an assessment of environmental impacts of industrial development in the Doon Valley, India. The work envisaged was as follows:

a) Development of a conceptual framework for an assessment of environmental impacts of industrial development in the Doon Valley;

b) Preparation of a baseline report describing present environmental conditions and past trends in the Doon Valley;

c) Development of computer software and provision of demonstration models for environmental management in the Doon Valley elsewhere;

d) Provision of advice to the Indian Department of the Environment with respect to setting up a supporting structure and facilities in India (e.g., national scientific team, monitoring systems);

e) On-the-job training of suitable national counterparts.

The data collection by the teams confirmed that there was environmental degradation in the valley and in particular this showed in

- a recent drop in the water-table in the vicinity of Dehra Dun during the dry season;

- visible scarring of valley slopes due to limestone quarrying, with resultant soil erosion and decreasing forest cover;

- poor air quality, particularly in the Dehra Dun - Mussoorie pocket, where limestone kilns are operating;

- deforestation due to increased firewood demand;

- declines in the numbers of valued species of birds, animals and fish.

The conclusions from this intensive study is that industry is only one of several causes for environmental deterioration in the Doon Valley. It is therefore essential that the environemntal impacts of industrial development be viewed within a comprehensive land-use management framework.

Redevelopment of the Doon Valley requires a thorough understanding of the carrying capacity of the region which depends on:

- levels of environmental quality deemed to be acceptable by society;

- the lifestyle expectations (incomes, food, shelter, eduction, etc.) of society;

- the investments that society is prepared to make on environmental protection and pollution control equipment;

- externalities such as new technologies, changes in world trade patterns, etc.

A fourth major area of UNIDO's work is in the area of:

Industrial and Plant Safety and Emergency Planning Systems

The December 1984 tragedy in Bhopal in which thousands were killed as a result of poison leakage from a pesticide plant was among the latest in a series of major industrial mishaps which have shaken the world.

The most recent industrial accident was that of Chernobyl.

Tragically, such mass disasters may become increasingly frequent unless deliberate action is taken by the world community and by individual governments now.

Toxic materials and toxic waste disposal is a foremost environmental and health problem and it must be recognized as a part of industrial development.

UNIDO is assisting several governments of developing countries to identify and classify their hazardous waste to elaborate legislative as well as organizational solutions, to elaborate guidelines for appropriate disposal and control and to foster plant and surrounding area safety procedures.

Countries such as Indonesia and Thailand, Portugal and Poland are ready to begin the implementation of such projects with UNIDO's expert advice.

UNIDO's Future Plans and Work

Our work and the direction and focus of it depends partly on the specific requests for assistance from governments and partly on our technologists' and policy makers' perception of the rising needs and urgencies.

An area that requires UNIDO's special attention is the problem of transboundary pollution.

For example, the burning of fossil fuels for energy generation has been recognized as a major source of air pollution (acid rain). European public attention to this problem rose initially in the northern and central part of Europe. However, at this time, it is evident that the less industrialized European countries are also affected. As a matter of fact this problem has been noted also in certain developing countries' regions such as Latin America and Asia.

UNIDO shares this growing concern over actual and potential damages to health and the natural environment and is developing a comprehensive programme which will provide assistance to interested governments for utilization of energy source-oriented controls and transfer of technological information services. This latter is of particular importance because some industrialized countries have already undertaken advance research on this problem. However, comprehensive research projects or pilot plants are extremely costly and many countries - especially among the developing ones - may not be able to duplicate these programmes. The exchange of technological information plays, therefore, a growing role in the area of emissions control and UNIDO is ready to contribute in closing this gap and to assist countries to avoid duplication of expensive research.

Clearly toxic materials and waste management, energy resources development and conservation, low- and non-waste technology, risk assessment, industrial and plant safety and emergency planning, transboundary pollution, are foremost concerns of both industrial and industrializing countries at this time.

The fact that already exists ample know-how and research in industrial countries as well as the fact that industrial countries are willing to transfer their know-how to developing countries is encouraging and UNIDO is ready to share and participate in the international drive to promote a safe and humane World.

CONCLUSIONS

Societies face problems of choice in the face of scarcity that are similar to those confronted by an individual or a family. Such a problem of choice is confronted when we decide what level of pollution control or environmental quality we want to achieve.

Viewing the problems in this way makes it clear that zero risk is unrealistic. As it was mentioned earlier, the costs of achieving complete control of pollution are probably far greater than we as a society would desire to incur.

On the other hand, it seems clear that we are increasingly unwilling to live with present levels of risk.

Pollution control and risk minimization like everything else, is scarce and we must choose how much of it we want. The range of choice lies between zero pollution and zero pollution control.

What is important is that public concern about risk assessment and environmental/safety problems is an increasingly important political force in particular in industrial but also in industrializing countries.